

ABSTRACT

When humidifying, almost to water vapor saturation, reformed gas that is supplied to a hydrogen electrode of a solid polymer type fuel cell (1) and air that is supplied to an oxygen electrode of the fuel cell (1), heating for obtaining water vapor to establish such saturation is not required. For the purpose of improving the thermal efficiency of a fuel cell system, water vapor contained in hydrogen electrode exhaust gas exhausted from the hydrogen electrode of the fuel cell (1) is let to penetrate through a water vapor permeable membrane (34), whereas water vapor contained either in air that is introduced into a partial oxidation reformation section (6) or in oxygen electrode exhaust gas exhausted from the oxygen electrode is let to penetrate through the water vapor permeable membrane (34) so that the water vapor is supplied to air that is supplied to the oxygen electrode of the fuel cell (1).